RP 504 Wind Forecasting Data

The following recommended practice (RP) is subject to the disclaimer at the front of this manual. It is important that users read the disclaimer before considering adoption of any portion of this recommended practice.

This recommended practice was prepared by a committee of the AWEA Operations and Maintenance (O&M) Committee.

Committee Chair: David Zeglinski, OSIsoft, LLC
Principal Author: Jeff Erickson, Versify

Purpose and Scope

The scope of “Wind Forecasting Data” describes best practices for the data required for accurate, actionable wind forecasting.

Introduction

By its nature wind generation is variable, intermittent, and uncertain. Employing sophisticated, data-driven methods to increase forecast accuracy enables more efficient and reliable power system operations. Short-term forecasts can be used for turbine active control and dispatch. Mid-term forecasts and day ahead forecasts can be used for power system management and energy trading and unit commitment and economic dispatch (optimizing plant schedules). Long-term forecasts are often used for longer term scheduling and maintenance planning at a wind farm.

Wind Forecasting Data

1. Procedures (Detailed Descriptions)

There is an ever growing volume of data points available to wind forecasters. While more data often means more accurate forecasts, one must weigh the cost and complexity of data-intensive methods against the results derived from simpler methods.

At its most basic level, there are two forms and sources of data necessary for any useable wind forecast: static data, such as latitude and longitude of the wind plant and hub height, and dynamic data, such as the measurement of metered power output. Adding historical output increases the value of the forecast by allowing for an empirical relationship between forecasted wind speeds and power output.

1. Procedures (Detailed Descriptions)
(continued)

Moving down a level in granularity, additional data sources can help a forecaster increase accuracy. Tracking current availability, i.e. the number of wind turbines available now and the power generation characteristics of those turbines, allows for a power conversion analysis to calculate lost generation resulting from planned maintenance at the wind farm. Forecast availability, such as the number of wind turbines expected to be available in the future and the power generation characteristics of those turbines, can help in planning for power de-rates associated with a future maintenance schedule.

Curtailments, whether from system operator instructions or transmission issues, impact forecasts and should be integrated into the forecast analysis data, both for real time and historical purposes.

Data about the wind itself, both wind speed and direction can be leveraged to increase forecast accuracy. Depending on the forecast providers' methods, varying degrees of wind data will be required and the forecast user should consult with the vendor to determine how much and what type of data to collect. Often if wind data is used, it is considered after power, availability, and curtailment data. Wind data can be collected directly from on-site MET towers or can be based on averaging nacelle wind speeds across the plant. Again, it is recommended that the end user consult with the forecast provider to understand the methods used.

At the lowest level of granularity, turbine-level data can be integrated into the final analysis. Turbine level data is often used to predict ramp forecasts, such as large changes in output. On-site and off-site temperature, humidity, air pressure, wind speed, wind direction, and power make up this category of data.

While data collection and integration techniques can differ among forecasters, the next and most immediate challenge is in turning this data into usable, action-based knowledge for the wind operator. Intelligent and timely operator response to wind forecast data can result in significant monetary benefit to the generator operator. Everything from the effective unit commit and generation balancing, to understanding the economic impact of a curtailment, to efficient, cost-effective maintenance scheduling can be positively impacted by timely, appropriate operator action in response to wind forecasts.

2. Tools

Tools that provide a common and easy-to-use interface to forecast data and that can help direct an operator to an appropriate action are critical to the future integration of cost-effective wind integration.

Tools are available today that allow end users to integrate third party vendor wind forecasts so that meteorologists and planners may visualize third party data, create and shape their own internal ensemble forecast, and integrate those with trading and market systems.

Summary

In the near future, the ability to analyze wind forecasting models and provide insight into the best models under different weather conditions will provide end users insight into the forecast data they are buying. Inherently, this will help produce more reliable wind forecasts and allow for more aggressive scheduling and marketing of wind energy to optimize revenue.